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in the strain of maximum effort. These drop out later, and a condition is finally attained in which 'the actual exhaustion point is reached without visible physical or mental signs of fatigue, and it seems to avail nothing to put effort into it.' *Third*, increase in the ability to make the movements rhythmically. Between the metronome beats each part of the movement, together with other stimuli from the apparatus, must be the stimulus for the next part, separated by a time interval that is practically equal to the full reflex time of such act. The whole must become 'a series of reflex actions joined together in a serial order by habit.' *Fourth*, endurance. This is interpreted as an 'increase in the power of the nerve centre to excite a muscle to perform a certain work a greater number of times than it could before the exercise.' Of the four elements in practice gain enumerated, this one is acquired more slowly. The working of these four factors, and their inter-relations in affecting the work capacity are then further traced out in the results. After three rest periods of six days each the work capacity begins each time at a point above that at which it stood when the rest period began. This they attribute to the last factor, accounting for it by the supposition that 'the nerve centres and muscles were in a state of incipient exhaustion, and that during the rest period they built themselves up to the highest level of metabolic change for which they had been prepared by the exercise.' A very large vicarious practice effect is found, when one hand is given a rest period while work with the other continues, and this in spite of the loss of inurement during the rest period for the unused hand. This vicarious practice they regard as mostly in the direction of co-ordination and rhythm. The records for the right and left hands also show certain differences in the progress of practice gain, indicating that the different elements in practice gain may enter in different relations for different muscles. 'Different muscles in the same person seem to show idiosyncracies in the way they work. What one accomplishes in the way of skill another makes up through endurance.' From all these relations it happens that the hand that shows the greater practice gain at first may not do so later, and the order of the two hands may alternate more than once. Again, lack of inurement at first keeps the record down. As this lack diminishes the practice gain will be great, and later it will be less, due to a change again in the relation of the factors that enter. In a daily series of several contractions to exhaustion with one minute pauses between, the recuperative value of the pauses may be different for the two hands; it changes with the degree of practice attained, as does also the relative recuperative value of the successive minute pauses. Hence, in regard to the value of the ergograph as a means of measuring work capacity, the authors conclude that 'ergograph records change relatively in the course of a long series and thus the first records in a series are invalidated, for maximum performances furnish a more reliable measure of work capacity. That since exercise induces a condition within the muscles themselves which reduces their capacity for work, ergograph records have slight validity until inurement has become thorough and co-ordination complete. That the ergograph is quite unadapted to the obtaining of exact statistics upon a large number of individuals. That records taken upon unpracticed subjects, both before and after operations, whose influences are thought to affect muscular power, are without the slightest claim to trustworthiness.'

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*The Principles of Logic.* PROFESSOR H. AUSTIN AIKINS, Western Reserve University. New York, Holt & Co. pp. x+489.

In view of the present wealth of text-books on Logic a new book on

this subject needs something to justify its existence. Professor Aikins's book has this justification. In his treatment of induction he has included several valuable chapters which do not appear in the ordinary text-book and he has endeavored to present deductive logic in a new way. He attempts to treat it from the objective standpoint. It is to be, not a science of thought nor a science of the proper arrangement of words but a science of things as they are dealt with in thought. It "points out the laws of things which all thought should respect," it "deals with the mental implications of the relations of things."

Instead of relations simply of inclusion and exclusion he makes use of five fundamental relations: those of individual identity, subject and attribute, causal or dynamic, non-dynamic and noetic, besides combinations of these. Conversion receives a broad treatment but the most important changes have to do with the syllogism. The traditional rules are thrown overboard and an attempt is made to find the underlying principle of each of the first three figures—the fourth being eliminated as involving no new principles. For the first figure the principle is: What is said to be true of every member of a group (or every object which possesses a given relation) is said about each one of them even though each is not separately thought of when the statement is made. Two cautions are added: 1. "A relation can belong to some members of a group without belonging to all the members, to any given member, or to any one of a given group of members," and 2, "To say that something is true of certain objects does not imply that it is false of others." Similarly of figures two and three, though the matter is more complicated in those cases.

This mode of treatment is certainly very attractive; it seems much less arbitrary; we may agree with Professor Aikins that it is more philosophical, at least in its aim, than is the traditional treatment; but the claim that it is better pedagogically is more than doubtful. The clearness and definiteness of the traditional treatment has a pedagogical value that is lacking here, particularly in the case of the second and third figures. The beginner would have more difficulty in applying the somewhat complicated system of principles and cautions than in using the old rules. For the advanced student Professor Aikins's method is certainly a good one and should deduction be taught in its proper place, after induction, his method might be applied to better advantage.

Particularly noteworthy in the portion of the book devoted to induction are the chapters on statistics, averages and testimony. The last is usually omitted altogether and the first two seldom receive more than a perfunctory discussion. Unfortunately the time usually allotted to logic is too brief to permit the use of the entire book.

A more serious objection to the work as a text-book is the amount of controversial matter it contains. It would have been better if the author had stated his positions dogmatically here and justified them in some work not intended for an elementary text-book.

Many points besides those noted should be discussed, if there were space, but it must be admitted that the author's aim is most praiseworthy and that, whatever the faults of his book, he certainly does make logic a live subject.

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*Die Perioden des menschlichen Organismus in ihrer psychologischen und biologischen Bedeutung*, von DR. HARMANN SWOBODA. Franz Deuticke, Leipzig, 1904. pp. 135.

This author scores current psychology, speculative and experimental, which he accuses of absolute fruitlessness. The laboratory gives us only a little more exact expression of what everybody knew before.